Social Communication Across Language Environments in Nonverbal Children with ASD from English and non-English Speaking Families

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Abstract

The purpose of this study was to examine the use of social communication acts exhibited by non-verbal preschool-aged children across different language environments. Children from English and non-English speaking backgrounds were exposed to social interactions with a bilingual interventionist who interacted with the children in a home and world language. Results of this study indicated that there were differences in social communication acts across participants, but not within participants across language environments. In this study, the children did not appear to discriminate between language environments, which supports previous research suggesting that there are no harmful effects in exposing children to more than one language. Implications of the findings, limitations, and future research directions are discussed.

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Chapter 1: Introduction to the Study

Characteristics of Autism Spectrum Disorder

Autism spectrum disorder (ASD) is a neurological disorder typically identified early in childhood that is characterized by deficits in social communication and the presence of stereotyped behaviors. A diagnosis of ASD is given when an individual meets the criteria proposed by the Diagnostic and Statistical Manual – 5th Edition (DSM-V). Because ASD is typically diagnosed through a series of psychological assessments and interviews, there has been significant controversy around the most recent diagnostic criteria, which has been revised to eliminate the previous autism related diagnoses of Asperger's Syndrome, Pervasive Development Disorder – Not Otherwise Specified, and Childhood Disintegrative Disorder that were previously described in the DSM-IV (American Psychiatric Association, 2000). The most recent diagnostic criteria for autism now consists of a broader categorical term of Autism Spectrum Disorders, with the intention of more clearly identifying individuals with a specific set of characteristics related to ASD (American Psychiatric Association, 2014). Currently, for an individual to be diagnosed with ASD, they must be identified as having deficits in the following three areas; (a) social-emotional reciprocity; (b) nonverbal communicative behaviors used for social interaction; and (c) developing, maintaining, and understanding relationships and adjusting to suit various social contexts (American Psychiatric Association, 2014). Previous diagnostic criteria for ASD in the DSM-IV included criteria for broad deficits in verbal language, fewer criteria for restrictive and repetitive behaviors, and did not allow for diagnostic criteria to be met based on history of behaviors. The recent changes to the

diagnostic criteria have been met with both support and disagreement over concerns related to accurately identifying children on the spectrum and whether the new criteria will provide better inclusion criteria or result in an underrepresentation of individuals who are higher functioning but still exhibit characteristics of ASD (Lord & Bishop, 2015). Regardless of opinion related to the recent changes in the diagnostic criteria for ASD, ASD continues to be a prominent diagnosis in early childhood, resulting in continued research on the prevalence, impact, and treatment of individuals with ASD.

ASD is characterized as a neurological disorder that has significant impact on social communication and interaction. Although there is significant variability in severity of symptoms, children with ASD frequently have difficulty with reciprocal communication, coordinating verbal and nonverbal behaviors, joint attention, and attention to communication from others (Hambly & Fombonne, 2011; Tardiff, Plumet, Beaudichon, Waller, Bouvard, & Leboyer, 1995). Additionally, the presence of restrictive and repetitive behaviors can also make social communication and interaction difficult, as these behaviors can interfere with their interactions with others and with the likelihood or frequency of other adults and peers interacting with those diagnosed with ASD (Boyd, McDonough, & Bodfish, 2013; Loftin et al. 2008; Nadig et al. 2010). These behaviors can have profound impact on a child with ASD's ability to communicate and interact in their social environments, whether it be their own social deficits or the presence of behaviors that impair the ability to interact successfully with others throughout their daily lives. Deficits in social communication have long been documented in individuals with ASD. These deficits are typically present early in development, with young children with

ASD showing lower levels of eye contact, less social smiling, and little joint attention (Hambly & Fombonne, 2011). And while not inherent to the recent diagnostic criteria of ASD, children with ASD frequently have delayed expressive and receptive language that further impacts their ability to interact socially with peers and adults. These deficits are frequently noted by parents or caregivers prior to 18 months of age, with significant delays frequently occurring into the early years of school, and with many who continue to show delays throughout their lives (Kozlowski, Matson, Horovitz, Worley, Neal, 2011). Rates of verbal and nonverbal communication delays for children with ASD have historically been difficult to determine, as previous diagnostic criteria viewed Pervasive Development Disorder Not Otherwise Specified and Asperger's syndrome as different from ASD, and have since been eliminated as diagnoses for children on the autism spectrum. These diagnoses are now considered to be part of the ASD, and are no longer used to classify individuals. With changes in the diagnostic criteria, it has been difficult for researchers to determine the exact incidence at which language delays and deficits occur in children with ASD and the prevalence of these delays as individuals with ASD continue through the developmental life span (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000).

Prevalence of ASD in the United States

As of yet, the biological markers for ASD are unknown, making the disorder difficult to identify, as well as to predict the severity of symptoms and outcomes. ASDs are diagnosed through psychological assessments and interviews, making the process of diagnosis subjective, time consuming, and difficult. ASD is considered one of the most

prevalent neurological disorders in early childhood, with the most recent data suggesting that ASDs occur in as many as 1 out of 68 children, with the rates being as much as 5 times higher in boys than girls (CDC, 2014). Specifically, a recent surveillance report released by the Center for Disease Control found that ASDs were identified as occurring in 1 out of 42 boys and 1 out of 189 girls in the United States (CDC, 2014). The prevalence rates of ASD have changed dramatically over the years, and it is generally accepted that the incidence is on the rise. In 2004, ASD was identified in 1 out of 125 children, indicating that the rates of ASD have doubled in the past 10 years (CDC, 2014). It remains unclear why the rates of ASD are increasing, but researchers have suggested that it is the more frequent assessment for ASD and increased reporting practices (Kogan, et al., 2009; Hansen, Schendel, & Parner, 2015). Additional researchers have speculated that the increase in ASD rates is due to the fact that the number of children with ASD that have average or above average intelligence are more frequently being identified as ASD based on the criteria in the DSM-IV and DSM-V. Previously, children who were diagnosed as ASD were those individuals who were considered lower functioning and likely had co-morbid disorders that contributed to the severity of ASD symptoms (Lord & Bishop, 2015). With the varied opinions put forth by researchers, combined with the lack of biological or physical markers for the disorder, it is difficult to identify a single reason that accounts for the increase in the prevalence rates of ASD. Regardless of the explanation for the increase in ASD rates, it is clear that diagnosis rates are increasing, and the occurrence of ASD is being documented worldwide.

Prevalence of ASD across Cultures

With the increased rates in children being identified as ASD, researchers are studying prevalence rates in various cultures and countries to determine if there are differences related to ethnicity or geographic region. Current research suggests that ASD occurs at similar rates in other countries and ethnic groups, when compared to the United States. Similarly, research has indicated that other countries and ethnic groups are also experiencing significant increasing trends over the last decade. Elsabbagh and colleagues (2012) conducted a systematic literature review to identify prevalence rates of ASD in a variety of countries based on epidemiological surveys published by researchers who examined the rates of ASD specific to countries or regions across the world. The authors included previous reviews of epidemiological surveys, and conducted extensive literature searches to identify countries and regions that were underrepresented in previous reviews. Stringent inclusion criteria were used to ensure that only high quality studies were included in the current report. The process resulted in the inclusion of over 600 studies that had not been previously included in published reviews of the prevalence of ASD. Articles included in the review expanded the prevalence rates to several new geographical regions, including Central and South America, East Asia, Western Pacific, South East Asia, and Africa. The authors used bilingual staff to review the research, and included studies published in 7 different world languages (Arabic, Chinese, Dutch, English, French, Portuguese, and Spanish; Elsabbagh, et al., 2012). The findings of the research indicated that prevalence rates for autistic disorder (AD) and pervasive development disorders (PDD; which included PDD-NOS and Asperger's syndrome) were

similar across geological regions. Prevalence rates for ASD vary from current statistics, due to changes in the DSM diagnostic criteria and the inclusion of older studies in the review. The elimination of PDD diagnoses in the current DSM-V further complicate the determination of prevalence rates, as it is unclear if those diagnosed as PDD would still have a diagnosis of ASD under the current DSM-V criteria. Additionally, this review also included older studies and reports, some dating back 3 or more decades, which altered the statistical averages when combining reports to determine prevalence rates. Results of the review examined prevalence rates of AD and PDD across the Americas, Europe, Asia, and Africa, which included several countries that were previously underrepresented in the literature. Although the authors found that there was variability in prevalence rates prior to 2000, more recent studies have found more similar rates of AD and PDD across countries and regions. Overall, the authors found that the rates of ASD and PDD were approximately 62 in 10,000 for AD and PDD, combined. Although there was variability in prevalence rates for AD and PDD, even when just examining studies conducted after 2000, the authors did not find any geological regions to be of significant difference in the literature. Additional research has also documented similar incident rates across geographical regions, as well as the increased rates of ASD across several of these countries (Blaxill, 2004; Fombonne, 1999; Magnusson & Saemundsen, 2001; Scott, Baron-Cohen, Bolton, & Brayne, 2002).

Although the prevalence of ASD across countries has been documented in the literature, there is also substantial research examining the prevalence rates of ASD within cultures and various demographic variables in an attempt to identify trends in prevalence.

In a survey published in 2009, researchers found variance in prevalence across demographic groups within the United States (Kogan, et al. 2009). In this study, researchers found that non-Hispanic black and non-Hispanic multiracial children had a lower incident rate of ASD when compared to non-Hispanic white children (57% and 42% lower odds, respectively). Researchers also examined the severity of ASD symptoms, but found no significant differences in severity across demographic groups. Similarly, researchers have continued to find variance in ASD prevalence in racial and ethnic groups, with Non-Hispanic white children approximately 30% more likely to be identified with ASD than non-Hispanic black children and were almost 50% more likely to be identified with ASD than Hispanic children (Baio, 2014). However, this study did identify differences in severity in regards to the proportion of children classified in the range of intellectual disability differed by race/ethnicity. Specifically, approximately 48% of non-Hispanic black children with ASD were classified in the range of intellectual disability compared with 38% of Hispanic children and 25% of non-Hispanic white children. In a more localized study, researchers examined a cohort of children born in Los Angeles County, an area considered to be diverse in terms of United States population, who received a diagnosis of ASD between 3 and 5 years of age (Becerra, et al., 2014). In this study, researchers found that children of mothers who were foreign-born black, Filipino, or Vietnamese had higher risks of being diagnosed with an ASD than children born to white United States mothers (Becerra, et al., 2014). When the researchers examined ethnic groups among mothers that were born within the United States, children with white mothers had the lowest rate of ASD among ethnic groups. United States-born

mothers who identified as Black, Hispanic, or Asian had similar prevalence rates of children with ASD, which were consistently lower than their foreign-born counterparts (Becerra, et al., 2014). This study also supported the previously discussed work of Baio (2014), and found that the same children who were considered at higher risk for an ASD diagnosis were also more likely to have additional diagnoses of mental retardation and impaired expressive language, suggesting that there was a more severe ASD symptomology present in these ethnic groups. Although these studies have found variance in the prevalence of ASD across ethnic groups, recent data published by the CDC have suggested that the prevalence rates within these ethnic groups is also increasing at a disproportionate rate. Specifically, the CDC (Baio, 2012) reported a 91% increase in the prevalence among black children and a 110% increase among Hispanic children, which was compared to a 70% increase among white children over the last decade. It is unclear if these disproportionate increases are due to better practices in identifying children with ASD with ethnic groups that have historically had less access to health care, or if there is another basis for these findings.

In summary, the diagnosis of ASD is increasing, evident further in the rates documented in various countries and when studied across demographics within countries. While it is unclear why the rates vary across cultures, it is also unclear if the prevalence rates are due to miss-diagnosis or if the prevalence rates may actually be variable across cultures. Concerns have been raised that ASD label may cause individuals diagnosing or intervening with children with ASD to treat the behaviors of students as symptomatic of ASD, when there may be a cultural basis for the behavior (Wilder, Dyches, Obiakor, &

Algozzinev, 2004). For example, it is more common for Asian American children to avoid eye contact with an adult or respond to a teacher's question with science than White children (Lian, 1996). With little or no eye contact being a frequent characteristic of ASD, it could be a possibility that little eye contact, which could be a cultural behavior for some Asian American children, could be interpreted as a symptom of ASD in the student. Regardless of reason for the increased rate of ASD, current data suggest that there is variability among racial and ethnic groups within the United States, and that these groups have experienced significant increases in prevalence rates over the past decade.

ASD in the Schools

The prevalence of ASD and variance across groups has been largely documented in the literature using information collected from medical databases or through individuals that have been diagnosed with ASD in a medical or psychological community. While ASD is frequently initially diagnosed in the medical community, parents and caregivers seek out a wide variety of services to determine the presence of ASD and to further address the needs of children with ASD (Dymond, Gilson, & Myran, 2007; Hume, Bellini, & Pratt, 2005). Despite the fact that the providers and services accessed vary by demographic group, needs, and age, the public school system remains a large resource for families who have children with ASD (McConachie & Robinson, 2006).

Within the public school system, outside medical diagnoses are not used to qualify students with ASD for services in special education, although when a medical diagnosis is provided, it frequently results in a school evaluation for autism. Autism

became a category for services in special education in the 1991 amendments to the Individuals with Disabilities Education Act (IDEA, 2012). In the ten years following the addition of this category, the number of students identified with autism in the school systems has more than quintupled (Laidler, 2005). Educational professionals do not use an outside medical diagnosis of ASD to immediately qualify a student for special education; instead, they rely on their own testing and assessment to determine whether a student meets the educational criteria for autism as a way to access the specialized services to meet the educational needs of students with autism. Although similar to the criteria used in the DSM-IV, the current educational definition of autism refers to "a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before the age three, that adversely affects a child's educational performance" (IDEA Part C, 2004). Specific criteria in the state of Minnesota require that an evaluation team must determine that the student demonstrates a qualitative impairment in two of the three following areas: qualitative impairment in social interaction (requiring two or more indicators in the area of limited facial expression, friendships, misinterprets other's behavior or social cues, limited joint attention, or prefers isolated activities); qualitative impairment in communication (requiring one or more indicator in the area of limited or no use of pointing to request, limited understanding of nonverbal communication, absence or delay of social language, odd production of speech, repetitive speech, inability to imitate, or lack of varied play); restricted, repetitive, or stereotyped patterns of behavior, interests, and activities (requiring one or more indicators in the area of repetitive hand or finger mannerism, lack

of imaginative play, over- or under- reaction to sensory stimuli, intense interests, ridged thinking, or insistence on routines; MDE, 2007). A diagnosis of autism would not be would not apply if the child's educational performance is adversely affected primarily because the child has an emotional disturbance or a language delay. Despite the fact that the assessment process and materials used for qualifying for special education can be similar to those used in a medical model, a student who is found by an education team assessment to meet the criteria for ASD results in an educational diagnosis, not a medical diagnosis. This fact can result in some children having an educational diagnosis of autism, but not a medical diagnosis, and vice versa. While the United States educational system is reporting an increase in the number of students being served under the category of autism, there appears to be more variability in the rates in which students are identified by ethnic background and geographic location.

Sullivan (2013) examined the prevalence and risk factors of students identified with autism within the school systems of 46 states. Results indicated that 1 in 228 students were identified as meeting criteria for autism in special education, but the rates varied significantly across states. Sullivan (2013) reported that some states were up to 9 times more likely to identify students with autism than others. Additionally, Hispanic and American Indian students were less likely to be identified as meeting the criteria for an educational diagnosis of autism than White students, and Asian students were more likely to be identified with autism than white students. Results of this study indicate that schools have greater variability in the identification of children with ASD among different ethnic groups than what has been reported in the medical and psychological

community. The difference in these findings may be due to less stringent criteria for autism when evaluated in a special education setting, fewer trained individuals conducting assessments, or the possibility that comorbid disorders (such as language delays or cognitive delays) taking more precedence in an evaluation within a school system (Palmer, Walker, Mandell, Bayles, & Miller, 2010). While there are several possible explanations for the variance in rates of autism in educational settings that is not documented in the medical and psychological literature, the increased identification of autism in the schools is to be expected with the increased identification across culturally and linguistically diverse students, as well as the increased cultural and ethnic diversity in the school system.

Multicultural Education and Children with ASD

Over the past decades, the United States school systems have become increasingly diverse (Sleeter, 2001; Richards, Brown, & Forde, 2007; Juvonen, Nishina, & Graham, 2006). This has created a need for teachers to become culturally responsive educators to effectively meet the needs of the students that are coming from increasingly diverse backgrounds. Cultural diversity in the schools creates a challenge to teachers and administrators as they are faced with increased diversity and educational backgrounds with their students (Futrell, Gomez, & Bedden, 2003). Nationally, fewer than 15% of teachers and fewer than 12% of the school administrators are from ethnic minority groups (National Center for Educational Statistics, 2009). Additionally, Hinchey (1994) reported that within the teacher education population, 85% are from the middle socioeconomic class. This is not to suggest that these factors are indicative of poor teachers, but rather

that teachers who come from these backgrounds may not have experience with or understanding of these populations, which can make it more difficult to effectively teach students who come from diverse backgrounds (Sharma, 2005).

The importance of multicultural teaching has also been highlighted by the National Council for Accreditation of Teacher Education (NCATE; 2008), who have included professional and diversity standards that require teacher candidates to "understand language acquisition; cultural influences on learning; exceptionalities; diversity of student populations, families, and communities; and inclusion and equity in classrooms and schools." Effective multicultural teaching requires culturally sensitive strategies and content to provide equal opportunities for educational success and student growth. This can be achieved when teachers understand the cultures of students and the students trust those teaching them (Biger, 2002; Schlosser, 1992). The need to create knowledge and understanding of diverse cultures will require that teachers are given additional training and experiences to prepare them for increasingly diverse students and student needs (Ford, Grantham, Whiting, 2008). Although a detailed evidence based practice review of multicultural teaching is beyond the scope of this paper, there is general consensus that effective multicultural education includes integration of multicultural content, creating multicultural knowledge and awareness, reducing prejudices among educators, equitable instruction and assessment, and empowerment of school culture (Ladson-Billings, 2004).

With both the diagnosis of ASD on the rise and the increased diversity in our schools, it is important to consider the implications for teaching students with ASD from

diverse populations. Current research indicates that children from diverse backgrounds are disproportionately identified for special education, findings that also hold true for students identified and served under the more specific special education category of autism (Sullivan, 2013; Palmer, et al., 2010). Not only are teachers who work with students with ASD faced with increased diversity and the requirement to be effective multicultural educators, but they are also required to be knowledgeable in evidence based practices to address the unique strengths and needs of students who have disabilities. Although there are many similarities in the issues that teachers face when working with diverse student populations and students with special needs, the need for teachers to be competent in both areas can create a larger challenge. To effectively education students with ASD from diverse backgrounds, teachers need to be knowledgeable about the student's cultural background and effective teaching strategies to meet the individual needs of students with ASD (Irvine, 2012). To date, there is very little published literature on multicultural education and children with ASD.

Chapter 2: Literature Review

Educating Children with ASD

Research has established that providing children with access to high quality, early intervention that utilizes evidence based strategies can result in better developmental outcomes for children diagnosed with ASD than for those children who do not receive such services (Dawson et al. 2010; Kasari et al. 2006; Landa et al. 2011). Overall, there appears to be a general consensus that the behavioral deficits and excesses in children with ASD are most effectively addressed through intervention approaches that are behavioral in nature (National Research Council, 2001). Most commonly, the techniques derived from applied behavior analysis (ABA), often referred to as intensive early intervention behavior therapy (IEIBT), which utilizes principles of behavior analysis, are the most commonly supported methods to increase skill deficits and reduce aberrant behaviors that are symptomatic of ASD. IEIBT, a treatment model developed by Lovaas (1987), typically is recommended as a one-on-one, 30-40 hour per week approach that is designed to address skill deficits, such as language, social communication, adaptive skills, and reduce aberrant behavior. With the IEIBT approach recommending that children receive 30-40 hours per week of one-on-one intervention (Lovaas, 1987; Eldevik, Hastings, Hughes, Jahr, Eikeseth, & Cross, 2010), it is understandable that this is not a feasible approach for students in the public school system or for families that are unable to be home with their children.

The need for intensive intervention for children with ASD has placed an increase demand on school systems to provide high quality education, which frequently includes

supplemental services to meet the needs of children with ASD. Within the special education setting, children with ASD often receive several services to address their needs, outside of typical special education classes. In a survey conducted by Wei, Wagner, Christiano, Shattuck, and Jennifer (2014), researchers found that the most common special education service received by children with ASD was speech language therapy (with a range of 66.8% to 85.2% across 3 cohorts). The second most common special education service was occupational therapy (with a range of 50.1% to 65.3%). The high rates of students receiving speech language services and occupational therapy is consistent with the common characteristics of ASD, which include language delays, impaired social interactions, and repetitive and restrictive behaviors. Although children with ASD often require additional and tailored services by specific service providers inside and outside of the classroom, there is still a need for their primary educators to provide high quality instruction and intervention throughout the school day.

As intensive one on one services are not typically available within a classroom setting, it is more common for classrooms to incorporate comprehensive treatment models or incorporate a variety of evidence based strategies as a method to teach children with ASD. Research supports the efficacy of this approach, with studies showing that children with ASD are able to make gains when teachers are able to effectively incorporate these evidence based models and strategies at a high fidelity into their classrooms (Odom, Hume, Boyd, & Stabel, 2012). Although evidence based strategies have been shown to be effective for children with ASD, there are still questions remaining as to which strategies are the most effective, and how intensive services must

be (Boyd, et al., 2014). Similarly, additional questions can be asked regarding which strategies, how they are delivered, and at what level of intensity, are most effective for children with ASD from diverse backgrounds, including those from families who do not speak the language in which intervention is provided.

A large area of research in the field of ASD has focused on intervention and treatment strategies. Although the strength of empirical support varies across strategies and interventions, it is apparent that there is a large amount of research dedicated to addressing deficits that are characteristic of ASD. For children with ASD, a large area of need is communication, which includes the skills necessary to communicate verbally and nonverbally with others in their environment to have their needs met, as well as to exchange thoughts and ideas with others in their environments. Communication is a complex area of skill development that can vary depending on the presence or absence of disabilities or due to environmental experiences, such as exposure to more than one language. As such, communication development remains an integral, yet complex area of intervention for children with ASD.

Communication Development in Neurotypically Developing Children

Communication development has been studied in the medical and psychological field for many years. The first 3 years of life, a time when the brain is rapidly developing, is generally considered the most intensive period for acquiring speech and language skills (Kuhl, 2004). Language skills are thought to develop best in environments where children are exposed frequently to a variety of sounds, sights, and speech of others. Researchers have discussed the idea of a "critical period" for language development (Knudsen, 1999).

Although it remains unclear as to the exact time period for this development, as well as the skills that are prominently developed during these periods, there is a general consensus that it occurs early in the development of infants and young children, when the brain is quickly developing and able to absorb language (Kuhl, 2004). If an infant or child is not exposed to language during these critical periods, it can be more difficult for the child to learn and develop language skills later in life (Mayberry & Lock, 2003).

Communication begins at the early stages of infancy, when a child learns that crying can result in having his or her physical and emotional needs met (Kuhl, 2004). Around 6 months of age, infants are typically able to recognize the speech sounds that compromise their native language. Although individual development of speech and language skills vary by individual, there is a typical progression that infants and children are believed to follow. Typically, at 0-3 months of age, an infant can discriminate phonetic sounds of all languages and regularly produces non-speech sounds. Between the ages of 3-9 months, a child begins to recognize specific language sounds and begins to discriminate among sounds that are from their native and non-native languages. At the early period in this developmental phase, infants begin to make vowel-like sounds, and progress to babbling that includes vowel and consonant sounds. At 12 months of age, children show a sharp decline in the recognition of non-native language sounds and words, and an increase in the recognition of native language sounds. This is also the age where children begin to produce their first words or word approximations. (Kuhl, 2004). Language development is also largely enhanced by the social environments that infants and children are exposed to during their growth. Social interaction with other individuals

(adults and children) is believed to have a strong influence on both speech production and the understanding of speech (Kuhl, 2004).

For neurotypically developing infants and children, nonverbal behaviors, such as facial expression, eye gaze and gestures, begin within the first year of life (Trevarthen & Hubley, 1978). These behaviors are used to communicate their needs and affect with caregivers in their environment. Additionally, these behaviors are frequently used to initiate and maintain social interactions with others. In neurotypically developing children, gestures develop simultaneously with first words (Acredolo & Goodwyn, 1985). As infants grow, their behavior becomes more complex and varied, to increase the quality of social interactions and to communicate their increased needs to others in the environment (Wetherby, Cain, Yonclas, & Walker, 1988).

Communication Development for Bilingual Children

Language development in bilingual children has been an important area of research, but one that remains exceptionally complex. Many of the issues related to the complexity of this area of research are related to the nature of the languages of exposure, as some languages and cultures relying on verbal and nonverbal communication at different rates, and also the length of time a child or individual has been exposed to a second language. For some children, exposure to a second language can begin at birth, where as for other children, exposure to a second language begins when they enter an educational system. Research varies on what age of exposure means for bilingual competency, but some studies have indicated that at the age of 3, a child exposed to a second language will learn the second language successively, rather than simultaneously

(McLaughlin, 1984). Additionally, the degree to which children are exposed to a second language varies, depending on how much time they spend with other individuals who are speaking a second language. These variables have the potential to impact language development for children exposed to a second language, and may be particularly challenging for children who are bilingual and who also have language delays.

Although there are several variables that impact language development in bilingual children, researchers have sought to control for these variables to have a better understanding of language development for children who are exposed to more than one language in the early years. Although current research has suggested that children exposed to multiple languages are not negatively impacted, there are areas of language development that differ slightly for bilingual children when compared to children that are only exposed to one language (Winsler, Diaz, Espinosa, & Rodriguez, 1999; McLaughlin, 1995). Some researchers have found that, for neurotypically developing children, some children will show strength in one language, but the second language is not considered delayed or impaired (Hakansson, Salameh, Nettelbladt, 2003). Additionally, there are several studies that indicate that, for neurotypically developing children, exposure to a second language can lead to increased awareness of language and greater cognitive flexibility (Bain, 1980; Díaz, 1985; Galambos & Hakuta, 1988; Kessler & Quinn, 1980).

Tabors and Snow (1994) discussed language development of bilingual children and suggest that there are 4 stages that they pass through. First, the child uses only the home language. When they are exposed to people speaking a different language, they

either speak their home language, or do not speak at all. Second, children attempt to communicate nonverbally, a phase that varies in length of time for each child. This is also the time when bilingual children start to understand and track more of the second language. The third stage is where the child begins to use the second language with others who speak it, and is typically done in single words, short phases, or memorized phrases they have learned. The final phase is where the child begins to use the second language more productively to communicate with others and starts to demonstrate an understanding of the syntax of the second language. It is important to note that children go through these stages at different rates and there is frequently overlap among stages.

For children who are exposed to more than one language at an early age, it is common for children to engage in mixing, where the child will use both words in both languages (Goodz, 1994). Mixing occurs frequently at the early childhood level, and peaks around the age of 30 months (Goodz, 1994). As children continue to be exposed to a second language, it is also common for a child to engage in "codeswitching" (McLaughlin, 1995). This is when children use words or phrases in both languages and alternate between languages based on the language of the individual they are communicating with (McLaughlin, 1995).

With children who are exposed to two or more languages, it is important to recognize that the developmental process may vary from the language development of monolingual children. Bilingual children are thought to be developing two separate linguistic systems, which can cause differences in communication development when compared to monolingual children (Hakansson, Salameh, Nettelbladt, 2003). Bilingual

children, depending on age of exposure, may be more likely to use less of their home language, especially as they are learning the second language. They may also go through periods where verbal communication is reduced, and they rely more heavily on gestures as a way to communicate. As such, it is important for educators to realize that bilingual children are not necessarily delayed in their language, or confusing languages, but rather, may be in the process of adapting to the different language environments in which they are exposed.

Communication Development in Children with ASD

For most children with ASD, the pattern of development for verbal and nonverbal communication is atypical. This can include atypical development of skills that allow children with ASD communicate with others verbally and nonverbally, as well as to understand the verbal and nonverbal communication of others in their environment. The frequent delays in verbal skills are typically apparent in the early years of development (Mitchell, et al., 2006). One of the most common reasons that parents present concerns to service providers is the delay in the onset of spoken words (DeGiamcomo & Fombonne, 1998). These concerns are commonly not reported or noticed until around 18 months of age. In a longitude study, Anderson and colleagues (2007) monitored the speech development among 130 children with ASD from age 2 to 9. Under the DSM-IV criteria, researchers found that 24% of children with ASD and 59% of children with pervasive development disorder not otherwise specified obtained fluent speech (defined as the ability to use complex utterances to talk about topics outside of their immediate physical environment) by the age of 9. In the same study, researchers also reported that 30% of

those with ASD and 4% with PDD-NOS were termed nonverbal (defined as using no or few consistent words) at the age of 9. With the recent change in the DSM-V criteria for autism, there is a lack of available longitudinal research on nonverbal children with ASD under the new categorical term, however, it remains clear that verbal delays are an initial warning sign for parents and caregivers of children later diagnosed with an ASD. Additionally, based on the previous research, it is clear that verbal delays continue into late childhood for some children on the spectrum.

Although delays in verbal communication are often the most commonly reported concerns for parents of children with ASD, there are several areas of nonverbal communication that also are frequently delayed in children with ASD (Mitchell, et al, 2006). The nonverbal delays are common, both in terms of functional and social communication (Wetherby & Prutting, 1984). Researchers have indicated that gestures, such as pointing to objects or showing individuals objects, are common deficits in children with ASD (Landry & Loveland, 1988; Mundy, Sigman, Ungerer, & Sherman, 1986). Additionally, research has suggested that children with ASD use forms of communication that are less complex than those children who are neurotypically developing (Wetherby, et al., 1989). In a study by Wetherby and colleagues (1989), researchers found that children with ASD were more likely to use single gestures to communicate with others, as well as be less likely to combine gestures with vocalizations.

One area of focus for nonverbal social communication skills in children with ASD has been in the area of joint attention. Joint attention refers to a child's use of gestures,

such as pointing or showing objects, to share interest with other individuals (Mundy, Sigman, & Kasari, 1990). This skill also requires the use of eye contact and coordination of eye gaze between the object of interest and the communicative partner. Joint attention skills usually begin to develop within the first year of life in neurotypically developing children. For children with ASD, these skills are commonly delayed, and are often a focus of intervention programs for young children with ASD who display these deficits. Joint attention is an important skill for individuals to have, not only in terms of having the ability to communicate socially with others, but also as a way to learn naturalistically in the environment. The ability to follow a point or eye gaze of another person to a coordinated object allows the other individual to obtain information about the object, such as the object label or characteristics about the object. Joint attention has also been shown to be a predictor of language when studied in children with ASD. Mundy, Sigman, and Kasari (1990) conducted a longitudinal study examining joint attention skills and language development in young children with ASD. Results of the study indicated that children with ASD who had significantly delayed joint attention skills were more likely to have expressive and receptive language skill delays as well. Additionally, the researchers found that joint attention was the strongest predictor of language skills, and variables such as IQ and initial language levels were not indicative of future language skills. With gestural joint attention skills being a strong predictor of future language skills, as well as an important skill for naturalistic learning, it is important to provide intervention to increase the skills required for children with ASD to engage in joint attention. With a large research base supporting the notion of atypical development for

children with ASD, it becomes increasingly important for interventionists and educators to have the knowledge and skills to provide appropriate and effective intervention for children with ASD as they develop.

Communication development has been studied in neurotypically developing children, children from bilingual backgrounds, and children with ASD. There remains little research in the area of children with ASD from bilingual backgrounds. As such, it remains a possibility that children with ASD from bilingual backgrounds develop communication skills at different rates or in different developmental sequences than other bilingual children and/or other children with ASD. Without a clear understanding of communication development for children with ASD from bilingual backgrounds, it remains a challenge for educators and interventionists to provide the most effective strategies to meet the unique needs of these learners.

Educating Children with ASD from Diverse Backgrounds

With both the diagnosis of ASD on the rise and the increased diversity in our schools, it is important to consider the implications for educating children with ASD from diverse populations. The current literature base on educating children with ASD from diverse backgrounds is very limited. Dyches, Wilder, Sudweeks, Obiakor, and Algozzine (2004) published a paper discussing multicultural education and children with ASD. In that paper, the authors discussed the increased rate of ASD and the increased diversity of the schools with the intention of identifying the relevant areas of need for research on children with ASD from diverse backgrounds. The authors suggested that children with ASD from diverse backgrounds have the added challenge of understanding multiple

cultural expectations and norms, in addition to the challenges associated with the characteristics of ASD. They also reported that there were several studies published regarding prevalence rates across cultures, but almost no studies that examined interventions, outcomes, and family adaptation for children with ASD from diverse cultural backgrounds. Although there is a plethora of literature discussing multicultural teaching practices, there are very few publications discussing multicultural teaching and best practice interventions for children with ASD from diverse backgrounds.

While being a culturally responsive and competent teacher is an important skill in any educational role, there are some areas that may be unique to teachers who work with students with ASD. Characteristics of ASD can include impairment in social communication, delays in language, and restricted or repetitive behaviors. The identification and expectations of the behaviors associated with these characteristics can vary by culture, which can make it challenging to meet the needs of students with ASD and their families.

One area of concern when working with students with ASD from diverse backgrounds is home language. Students from diverse backgrounds often come from homes where English is not the primary language. This can create issues when teaching children with ASD language. The practice of using multiple languages with children who have developmental or cognitive delays has long been a topic debated in the literature. Early theories on language development suggested that when there is a language delay or impairment in a child's first language, the child will experience similar delays in the development of a second language (Cummins, 1979). Several reports on working with

bilingual families who have children with disabilities have stated that parents are frequently told by professionals to only use one language, as to not overwhelm the child (Kremer-Sadlik, 2005). However, with the increase in diversity in the United States and schools, researchers have continued to study the issue of bilingualism and children with developmental delays, and are finding that early theories are not accurate. Recent research on the effects of exposure to more than one language for children with disabilities (developmental delays or language impairments) has indicated that there is no negative impact on first language development (Gutierrez-Clellen et al., 2008; Feltmate & Kay-Raining Bird 2008; Hambly & Fombonne, 2011; Kay-Raining Bird et al. 2005; Paradis et al. 2003).

Researchers have recently started to more specifically explore the issues of bilingualism and ASD. A study by Hambly and Fombonne (2011) examined the impact of bilingual exposure on social abilities and language levels in children from bilingual and monolingual households. They found that bilingually exposed children with ASD did not experience any additional delays in language development, but there were some differences in social interactions among children who were exposed to a second language before or after 1 year of age. Results indicated that the children with ASD who were exposed to a second language from infancy had higher social interaction scores than those children who were exposed to a second language after the age of 1 year. Although this study did not find there to be any additional language delays for bilingual children with ASD, the differences found in social interaction warrant further exploration.

To be a culturally responsive educator, teachers of students with ASD also need to understand that the label of ASD is applied at varying rates across multicultural groups. As mentioned previously, African American and Asian students are twice as likely to be served under a label of ASD as students identified as American Indian or Hispanic (Dyches, et al., 2004). Challenges frequently occur when assessments cannot be conducted in the child's native language, due to a lack of bilingual assessors. In the case of working with children with ASD, it is important to include speech language professionals that specialize in working with children with ASD and, additionally, those that work regularly with children who are considered English language learners (Wilder et al., 2012). Other than the few studies suggesting that providing intervention in a second language does not negatively impact children with disabilities, there is little known about the influence of home or English language when providing interventions.

Educators of children with ASD need to understand the unique needs of children with ASD, as well as be prepared to work with students from diverse backgrounds. This requires educators to have experience in evidence based practices, as well as be a culturally responsive teacher. Educators need to pay particular attention to the area of language and social behaviors for children with ASD, as certain cultures can place different values on various behaviors. Understanding that a child may be a part of a culture where different languages or social behaviors are encouraged will help educators make better decisions about assessment and intervention for children with ASD.

With the limited research on children with ASD from non-English speaking backgrounds, as well as the limited research on multicultural teaching for children with

ASD, there is a need to better understand how these children can best be served in the educational setting. Although research suggests that using two languages with children does not have a negative impact, it remains unclear as to what interventions and strategies may best serve bilingual children with ASD. The purpose of this study was to explore the social communication behaviors of children with ASD from English and non-English speaking families and to examine if exposure to individuals speaking in a child's home or world language impacted social communication behaviors. More specifically, this study sought to evaluate if a child with ASD would be more likely to engage in social communication behaviors when they were interacting with an adult speaking their home language.

Chapter 3: Methodology

Participants

Participants selected for this study included children from English and non-English speaking homes aged 36-72 months old, who were enrolled in pre-school services in a public urban school district in Minnesota. Participants included in the study were children who have an educational diagnosis of autism and were identified as having limited language skills. During recruitment, teachers were asked to identify children who were not using phrase speech, either speaking in single words or not using any words in English or their home (if different) language. To meet the requirements for inclusion in the study, children had to have an expressive language score that was two standard deviations below the mean on the Preschool Language Scale Fifth Edition (PLS-5, Zimmerman, Streiner, & Pond, 2011). The PLS-5 was completed by graduate students and the primary author, who were trained in its administration. The English version of the PLS-5 was administered to all participants to provide a consistent assessment for participants. This decision was made, as the PLS-5 was not available in the home language of all participants recruited in the study. Additionally, to confirm the diagnosis of autism, the Autism Diagnostic Observation Schedule (ADOS; Lord, et al., 1989) was administered by the primary author, who was trained in the ADOS and completed requirements to become research-reliable in its administration. All children included in the study met the cut-off for autism on the ADOS assessment, and severity scores were also in the autism range.

Children who participated in the study were from homes where English, Spanish, Vietnamese, or Russian were the primary languages spoken in the home. These languages represent 4 of the 9 most common languages spoken in the school district. Children identified as non-English speaking were those that came from families that speak a language other than English in the home more than 50% of the time and report themselves to the school district as non-English speaking. Children identified as English speaking were those that came from families that speak English in the home and were not exposed to another world language in their home or school setting. As part of the study, children were exposed to English and world language assessment sessions. Children from non-English speaking families were exposed to assessment sessions with their home language and English language. Children from English speaking families were exposed to an English language condition and another world language. The world language selected for children from English speaking families were the languages spoken by the families of the children who came from non-English speaking homes. Children from English speaking families were paired with children from non-English speaking families based on having similar language scores at the time of enrollment. The pairing of children was based on the Total Language Score calculated on the PLS-5 (PLS-5, Zimmerman, Streiner, & Pond, 2002). Pairs were created based on two children having the closest Total Language score among the recruited participants at the time of enrollment.

Three children were recruited from non-English speaking families. Beni was a 4 year 2 month old boy whose family identified Spanish as the primary home language. Thahn was a 5 year 8 month old boy whose family reported that Vietnamese was the

primary home language. Mikal was a 4 year 1 month old boy whose family identified Russian as the primary home language. Language and diagnostic testing results are reported in the Table 1.

For purposes of comparison, three children were recruited from homes where English was the primary language. Sam was a 4 year 8 month old boy and was matched with Beni (Spanish home language). Carter was a 3 year 7 month old boy and was matched with Thahn (Vietnamese home language). Jessie was a 4 year 4 month old girl and was matched with Mikal (Russian home language). None of the children from English speaking homes had previously been enrolled in any preschools or community classes where they were formally exposed to any other world language.

Interventionists were hired by the first author through a local translator service provider recommended by the school and through the university. The interpreters hired for the study were all experienced in conducting assessments in more than one language, as well as working with children. All interventionists were fluent in English, as well as the non-English language that they were assigned to (e.g., Spanish, Vietnamese, and Russian). One interventionist was assigned to each child and conducted all of the assessment sessions to limit any extraneous effects that could be attributed to preference for different interventionists. The interventionist was unknown to the child prior to the experimental settings. The same interventionist was assigned to both the non-English speaking child and the English speaking child assigned to the same world language [i.e., the child participant from the Russian speaking home and the child from the English speaking home (who was assigned to the Russian language condition) utilized the same

bilingual interventionist]. For one language condition, when participants were recruited across different years, a second Vietnamese interpreter was used for all sessions with the English speaking participant exposed to Vietnamese language conditions, as the interpreter hired the previous year no longer worked for that company.

Setting

All assessment phases took place in a separate room in the child's school of enrollment. The rooms were conference rooms or empty offices, and not typically used for student play or interaction. During the pre-assessment phase, the child and primary author were in the room, with no other adults or students present. During the assessment phases, the child, interventionist, and primary author (to videotape and monitor fidelity during the assessment sessions) were present in the room, with no other adults or students present. Each room contained a table and chairs for the child and interventionist.

Materials

Materials used in this study included five different play sets to evaluate social communication behaviors across language environments. The first play set consisted of a farm set, which included a barn, a farmer, and five farm animals (goat, horse, cow, chicken, and lamb). A second play set consisted of picnic items, including a multicultural family (mom, dad, brother, and sister), blanket, and miniature plates, utensils, cups, and pretend foods. A third play set consisted of a brown baby doll, doll clothes, blanket, bottle, and brush. A fourth set consisted of construction workers, blocks, bulldozer, digger, and steamroller. A fifth set, consisted of a castle scene, which included a castle, knights, dragons, and castle props.

During the language environment conditions, a vibrating alarm device was used to signal the interventionist to interact with the child at timed intervals. The device was a small GymBoss® timer that was kept in the interventionist's lap and activated briefly at 30 s intervals throughout the sessions to alert the interventionist to interact with the child.

All pre-assessment and language assessment conditions were recorded using a Kodak Pocket Video Camera and tripod. Videos were recorded in 1080p high definition and stored on SD cards. Sessions were transferred from SD cards to a computer for viewing and data collection.

Response Definitions and Measures

Throughout the course of data collection, several variables were coded to evaluate the nature of the social interactions, including vocalizations, signs and gestures, and giving and showing objects. Additionally, attending with the play sets was also coded to measure child attention to objects and the interventionist across assessment conditions. The following dependent variables were defined prior to data collection and provided to data collectors during training for video coding.

Directed Vocalizations. Vocalizations were defined as any vocal noises made during the session in which the child was looking at the interventionist, or paired with giving or showing an object, or a gesture directed to the interventionist. This included words and non-words, including gasps, laughter, and squeaks. Vocal stereotypy (which was rarely observed) was not scored. Directed vocalizations were recorded using event recording, with a 2 s lapse required for a new vocalization to be counted.

Undirected Vocalizations. Undirected vocalizations were defined as any vocal noises made during the session where the child was not looking at the interventionist. This included words and non-words, including gasps, laughter, and squeaks. Vocal stereotypy (which was rarely observed) was not scored, whether the child was looking or not looking at the interventionist. Undirected vocalizations were recorded using event recording, with a 2 s lapse required for a new vocalization to be counted.

Signs and Gestures. Signs and gestures were defined as any conventional or adapted signs or gestures used by the child directed towards the adult. This included signs for manding or requesting, as well as pointing or reaching with coordinated gaze to an object. Requests to be "all done" or to leave the room were not scored. Signs and gestures were recorded using event recording.

Giving or Showing Objects. Giving and showing objects was defined as anytime the child handed an object to the adult or held up an object oriented towards the adult's sight line. An instance of giving was not recorded if the adult reached for the item before the child started to hand the item to the adult. Giving and showing objects were recorded using event recording.

Attending. Attending was defined as any time the child was looking at the adult or play set or actively manipulating an object in the play set. Attending could be either appropriate (using the toy for its intended purpose) or inappropriate (eyeing the toy or repetitively spinning the wheels). Attending was measured in duration, to the nearest second. Anytime the child looked away from the object or interventionist for more than

three seconds the child was coded as not attending. The child was required to return their gaze to the objects or interventionist for 3 seconds to be coded again as attending.

Data Collection

Data were recorded from high-definition video recordings of each session. Videos were stored and reviewed for data collection on a computer. To capture relevant data, the Multi-Option Observation System for Experimental Studies (MOOSES; Tapp, J.T., Wehby, J.H., & Ellis, D.N., 1995) was used to collect event counts and duration measures of the dependent measures. MOOSES is a computer application that allows for simultaneous variables to be recorded in real time during an observation. This allowed for all of the dependent variables to be recorded simultaneously with timestamps to increase the accuracy of interobserver agreement analyses.

Reliability and Procedural Fidelity

Interobserver agreement was assessed by a second trained observer on 20% of sessions randomly selected for each child. Data were collected on all dependent measures from videotaped sessions. Interobserver agreement was completed by an advanced graduate student who completed training with the primary author, who also served as the primary coder. Interobserver agreement training sessions were conducted using videos not identified for interobserver agreement assessment. Training consisted of reviewing the dependent variable definitions and simultaneous independent coding. After each video was coded by the primary author and second coder, reliability scores were calculated for each variable. When the coders were 80% reliable on the same video, training was complete.

Interobserver reliability was assessed using the MOOSES analysis tool, which allowed for reliability calculations for event and duration recording. To determine interobserver reliability for event codes, a 3 s time window was established around the primary author's code file and comparing the codes to the second coder's file to determine agreement on the occurrence of dependent variables measured as a frequency count. To determine interobserver reliability for the duration measure, a second by second comparison of the primary coder's file and the secondary coder's file was used to determine agreement on duration in seconds throughout the video recordings. An agreement score was calculated for each of the dependent variables measured with event recording. For directed vocalizations, the overall average agreement across sessions was .97 (range of .82 to 1.0). For undirected vocalizations, the overall average agreement across sessions was .91 (range of .67 to 1.0). For gestures and signs, the overall average agreement across sessions was .83 (range of .5 to 1.0). For showing and giving, the overall average agreement across sessions was .88 (range of .5 to 1.0). For the duration measures, a kappa score was calculated. Overall agreement on attending was .52.

As a measure of procedural integrity, adherence to the treatment protocol was also assessed on 20% of sessions. A procedural checklist (Table 2) was created based on the procedures outlined for the pre-assessment phases and language assessment phases and was used to assess procedural integrity. Variables measured for procedural integrity included the presence or absence of the following: introduction to the play theme (present or absent), labeling items in the play set (present or absent), interventionist's questions delivered at each of the 30 s intervals (present or absent at 10 opportunities), the

interventionist's response to the child's use of directed vocals, giving or signing, or showing (present or absent based on child's response rate), and the correct language throughout the assessment session (measured in seconds). Following the collection of the procedural fidelity data, the percentage of adherence to all steps was calculated by dividing the total present scores by the total opportunities during an observation. An overall procedural integrity score was calculated for each variable measured. For introduction to the play theme, the procedural integrity score was 100%. For labeling items in the play set, the procedural integrity score was 100%. For responding to child's use of directed vocals, giving or signing, or showing, the procedural integrity score was 87%. For use of the correct language, which was calculated using a duration measure in seconds, the procedural integrity score was 96%.

Experimental Sequence and Design

This study consisted of two phases to examine social communication across language environments: a pre-assessment and a language environment assessment. The pre-assessment was conducted to examine the child's vocalizations, signs and gestures, and giving of objects, along with attending to each play set when exposed to the play set without verbal interaction with an adult. Then, using these measures of the child's social communication and attending, data were analyzed to identify play sets that had similar rates of social communication and attending and then randomly assigned to English language or a world language condition. Following the pre-assessment, a multielement design was used to assess social interaction in the context of different language environments (English and World language). Each child was exposed to an English and

World language environment assessment condition (described below) daily, with the order of the conditions counterbalanced across days. No more than two assessment conditions occurred per day.

Pre-Assessment. To examine each child's attending with the play sets, , each child was exposed to the play sets without any verbal interaction from an adult. During the pre-assessment, the child was seated at the table and the interventionist was seated across from him or her. The interventionist presented a single play set by placing it on the table. The child was allowed to engage with the play set for 5 min. The interventionist did not use any verbal language during the pre-assessment sessions. If the child directed any vocalizations to the interventionist, the interventionist made eye contact with the child, but did not comment. If the child showed or attempted to give an object to the interventionist, the interventionist briefly nodded in the direction of the child, but did not take the object. After 5 minutes, the interventionist removed the play set from the table and escorted the child from the room. While out of the room, the child was given a 5 min break where he or she interacted with another adult (primary author) briefly. Following the 5min break, the child was returned to the room for a second session with another play set using the same procedures. These procedures were continued until the child was exposed to the 5 play sets across 2 days. No more than three play sets were presented per day. The order of exposure to the play sets was randomized across children.

Rates of child attending, vocalizations, signs and gestures, and giving of objects were compared across play sets. If the play sets had equal rates of social communication and attending, play sets were randomly assigned to either the World Language or English

Language conditions, with two play sets assigned to World Language and two play sets assigned to the English Language condition. Because observed response rates were variable across participants, equal rates of social communication was defined as play sets having relevant measures of social communication (directed vocalizations, signs and gestures, and giving or showing objects) occurring within a pre-determined percent difference. This was calculated by subtracting the lower number from the higher number and then dividing it by the average of the two numbers for each measure of social communication. If measures for all social communication variable were within 20% of each other, the play sets were considered to be equivalent. For measures of duration, equal rates of attending was defined as sessions having the total number of seconds a child was coded as attending within a pre-determined percent difference of 20%. This was calculated by subtracting the lower amount of seconds from the higher amount of seconds and then dividing it by the average of the two amount of seconds for each pre-assessment session.

Matched play sets were then determined when at least 3 of the 4 measures of social communication and attending were within a 20% difference. The 3 out of 4 matching criteria for social communication behaviors was used to allow for matches to be created when there were extremely low rates of social communication behavior. Low rates of behavior resulted in high percent difference calculations for behaviors that occurred less than 3 times per session, but only varied by one occurrence across sessions. If 4 of the 5 play sets were all determined to be matches, the four play sets were then randomly assigned to an English or world language condition, with two play sets

assigned to each language condition. When all four play sets were not identified as matches, matches were created among two play sets. Then within each pair, one play set was assigned to an English language condition and the other was assigned to a world language condition.

Language Environment Assessment. Language environment assessments were conducted to evaluate the child's social communication in the context of world and English language environments. Each play set was assigned permanently to either a world or English language condition (based on the procedures described above) to assess social communication over the course of the study. A total of two assessment conditions were conducted each day, with the language/ play set order counterbalanced across days. A maximum of 2 sessions were conducted daily, with each child exposed to each of the 4 play sets twice for a total of 8 sessions across 4 days. Each session was 5 minutes in duration. Interventionists were trained by the author prior to the start of the language assessment sessions through modeling and practice sessions. Additionally, signs were posted behind the chair of the child during each session, with prompts related to the introduction sequence, example questions to ask the child, and instructions with how to respond to social communication bids.

During the assessment, the child was seated at the table with the interventionist. All language spoken by the interventionist during each session was in the targeted language for that session (English or world language). Children from non-English speaking homes were assigned the World language that was spoken in their family home, and children from English speaking homes were assigned the same language as their

matched peer. Both English and non-English speaking children were also exposed to an English session.

During the language environment assessment sessions, the interventionist presented the play set to the child and introduced the play set with a narrative in the target language. The narrative for each play set consisted of four to five sentences, which included introducing the overall play set theme, labeling 5 of the play items, labeling the characters, and setting up the play scenario. The narrative was not meant to direct the play, but to expose the child to a dose of the target language at the beginning of each language condition. Following the interventionist's introduction, the child was allowed to interact with the toys in the play set. To ensure that each child experienced a minimum amount of target language during each session, a vibrating alarm activated at 30 sec intervals to alert the interventionist to interact with the child. When alerted, the interventionist asked the child short questions in the targeted language related to the play sets and the child's focus of attending (i.e., "What is the goat doing?" or "What are you making?"). In addition, the interventionist was instructed to respond to any social communication acts made by the child (vocalizations, signs or gestures, or giving and showing) in the targeted language during the session by providing a one or two sentence response to the child's communicative act. If the child gave the interventionist a toy, the interventionist labeled the toy and interacted with the child and the toy briefly before returning the toy to the table (i.e., "You gave me the cup. I'm going to give your doll a drink…gulp, gulp, gulp."). If the child made a directed vocalization, such as a request (verbal, sign, or gesture), the interventionist would briefly comply with the request, when

feasible (requests to be “all done” or leave the room were ignored), or acknowledge the child. At the end of each session, the child was given a 5 min break, where the child were allowed to leave the room and interact with another adult.

Chapter 4: Results

Language Assessment

To assess language, the Preschool Language Scale – 4th Edition was administered prior to the start of the assessment phases. All assessments were conducted by graduate students from the university who were trained in administration procedures. For the children who were from non-English speaking homes, Beni received a total language standard score of 62 (expressive language standard score of 69 and a receptive language standard score of 58). Mikal received a total language standard score of >50 (expressive language standard score of >50 and a receptive language standard score of >50). Thahn received a total language standard score of 53 (expressive language standard score of 62 and a receptive language standard score of 51). For the children from English speaking homes, Sam received a total language standard score of 50 (expressive language standard score of 51 and a receptive language standard score of >50). Jessie received a total language standard score of 69 (expressive language standard score of 69 and a receptive language standard score of 62). Carter received a total language standard score of 56 (expressive language standard score of 64 and a receptive language standard score of 55). Participants were matched based on language scores based on recruitment periods. This study occurred across 2 school years, so matches were made on best available matches, and then on attending during pre-session assessment phases. Standard scores can be found in Table 1 below.

Diagnostic Assessment

All children recruited for the study carried an educational diagnosis of autism spectrum disorder. To confirm this diagnosis, the children were all administered the ADOS-2 assessment to confirm the presence of autism. The ADOS-2 was administered by the primary researcher, who met criteria to be research reliable in the administration of the ADOS. The ADOS-2 was administered prior to the start of assessment phases. All children met the criteria for Autism Spectrum Disorder cutoff, ADOS modules and severity scores can be found in Table 1 below.

Table 1. Participant demographics and test scores.

Participant	Age (Y.M)	Home Language	PLS Total Score	PLS Expressive	PLS Receptive	ADOS 2	ADOS Module	ADOS Severity Score
Beni	4.2	Spanish	62	69	68	12	Mod 1 Single Words	6
Sam	4.8	English	50	53	>50	17	Mod 1 Single Words	7
Mikal	4.1	Russian	>50	>50	>50	24	Mod 1 No Words	9
Jessi	4.4	English	69	69	62	20	Mod 1 Single Words	9
Thahn	5.8	Vietnamese	53	62	51	21	Mod 1 Single Words	8
Carter	3.7	English	56	64	55	16	Mod 1 Single Words	7

Pre-Session Assessment

Pre-session assessments were conducted with the 5 play sets and used to identify play sets to be assigned to the two language conditions. Table 2 below summarizes the response rates across dependent variables and attending for all participants.

Beni was administered all 5 play sets. On the castle play set, he engaged in 2 directed vocalizations, 29 undirected vocalizations, 0 gestures, and 1 instance of showing. He was coded as attending 97% of the time. On the construction play set, he engaged in 4 directed vocalizations, 27 undirected vocalizations, 1 gesture, and 1 instance of showing. He was coded as attending 100% of the time. On the farm play set, he engaged in 2

directed vocalizations, 32 undirected vocalizations, 0 gestures, and 2 instances of showing. He was coded as attending 99.5% of the time. On the picnic play set, he engaged in 2 directed vocalizations, 33 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the baby play set, he engaged in 1 directed vocalizations, 21 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 95.1% of the time. Based on the data, the castle play set and the picnic play set were identified as a matched set based on similar rates of the dependent variables and attending and were randomly to an English and Spanish language condition, respectively. Additionally, the farm play set and construction play set were identified as a matched set, and were randomly to an English and Spanish language condition, respectively.

Sam was administered all 5 play sets. On the castle play set, he engaged in 0 directed vocalizations, 2 undirected vocalizations, 1 gesture, and 1 instance of showing. He was coded as attending 94.6% of the time. On the construction play set, he engaged in 0 directed vocalizations, 4 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the farm play set, he engaged in 0 directed vocalizations, 6 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the picnic play set, he engaged in 0 directed vocalizations, 3 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 91% of the time. On the baby play set, he engaged in 0 directed vocalizations, 3 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 93.5% of the time. Based on the data, the baby play

set and the picnic play set were identified as a matched set based on similar rates of the dependent variables and attending, and were randomly to an English and Spanish language condition, respectively. Additionally, the farm play set and construction play set were identified as a matched set and were randomly to an English and Spanish language condition, respectively.

Mikal was administered all 5 play sets. On the castle play set, he engaged in 2 directed vocalizations, 11 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 91.1% of the time. On the construction play set, he engaged in 2 directed vocalizations, 10 undirected vocalizations, 0 gestures, and 1 instance of showing. He was coded as attending 91.1% of the time. On the farm play set, he engaged in 0 directed vocalizations, 6 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the picnic play set, he engaged in 1 directed vocalization, 9 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the baby play set, he engaged in 3 directed vocalizations, 13 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 96.3% of the time. Based on the data, the castle play set and the baby play set were identified as matched sets and were randomly to an English and Russian language condition, respectively. Additionally, the construction play set and picnic play set were identified as a matched set, and were randomly to an English and Russian language condition, respectively.

Jessie was administered all 5 play sets. On the castle play set, she engaged in 2 directed vocalization, 28 undirected vocalizations, 3 gestures, and 0 instance of showing.

She was coded as attending 82% of the time. On the construction play set, she engaged in 1 directed vocalizations, 11 undirected vocalizations, 1 gesture, and 0 instances of showing. She was coded as attending 94.6% of the time. On the farm play set, she engaged in 0 directed vocalization, 10 undirected vocalizations, 1 gesture, and 0 instances of showing. She was coded as attending 93.4% of the time. On the picnic play set, she engaged in 1 directed vocalization, 11 undirected vocalizations, 0 gestures, and 0 instances of showing. She was coded as attending 96.5% of the time. On the baby play set, she engaged in 1 directed vocalization, 12 undirected vocalizations, 1 gesture, and 0 instances of showing. She was coded as attending 100% of the time. Based on the data, the picnic play set and the baby play set were identified as matched sets and were randomly to an English and Russian language condition, respectively. Additionally, the construction play set and farm play set were identified as a matched set, and were randomly to an English and Russian language condition, respectively.

Thahn was administered all 5 play sets. On the castle play set, he engaged in 0 directed vocalizations, 3 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the construction play set, he engaged in 0 directed vocalizations, 7 undirected vocalizations, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the farm play set, he engaged in 0 directed vocalizations, 14 undirected vocalizations, 1 gesture, and 0 instances of showing. He was coded as attending 100% of the time. On the picnic play set, he engaged in 0 directed vocalizations, 1 undirected vocalization, 0 gestures, and 0 instances of showing. He was coded as attending 100% of the time. On the baby play set, he engaged

in 1 directed vocalizations, 9 undirected vocalizations, 0 gestures, and 1 instance of showing. He was coded as attending 100% of the time. Based on the data, the castle play set and the picnic play set were identified as matched sets and were randomly to an English and Vietnamese language condition, respectively. Additionally, the baby play set and construction play set were identified as a matched set, and were randomly assignment to an English and Vietnamese language condition, respectively.

Carter was administered all 5 play sets. On the castle play set, he engaged in 0 directed vocalizations, 2 undirected vocalizations, 3 gestures, and 1 instance of showing. He was coded as attending 93.8% of the time. On the construction play set, he engaged in 1 directed vocalization, 3 undirected vocalizations, 1 gesture, and 2 instances of showing. He was coded as attending 88.7% of the time. On the farm play set, he engaged in 0 directed vocalizations, 1 undirected vocalization, 0 gestures, and 2 instances of showing. He was coded as attending 68.1% of the time. On the picnic play set, he engaged in 0 directed vocalizations, 2 undirected vocalizations, 0 gestures, and 3 instances of showing. He was coded as attending 87.3% of the time. On the baby play set, he engaged in 0 directed vocalizations, 2 undirected vocalizations, 1 gestures, and 1 instance of showing. He was coded as attending 79.4% of the time. Based on the data, the construction play set and the picnic play set were identified as matched sets and were randomly to an English and Vietnamese language condition, respectively. Additionally, the baby play set and farm play set were identified as a matched set, and were randomly assignment to an English and Vietnamese language condition, respectively.

Table 2. Pre-session response rates and attending.

Participant	Play Set	Directed Vocalizations	Undirected Vocalizations	Gestures	Showing	Percent Attending
Brian	Baby	1	21	0	0	95.1%
	Castle	2	29	0	1	97.0%
	Construction	4	27	1	1	100.0%
	Farm	2	32	0	2	99.5%
	Picnic	2	30	0	0	100.0%
	Play Set	Directed Vocalizations	Undirected Vocalizations	Gestures	Showing	Percent Attending
Colton	Baby	1	4	1	3	58.7%
	Castle	0	1	0	2	98.1%
	Construction	0	0	0	6	97.3%
	Farm	0	2	2	1	59.4%
	Picnic	0	2	3	1	93.8%
Mikal	Play Set	Directed Vocalizations	Undirected Vocalizations	Gestures	Showing	Percent Attending
	Baby	3	13	0	0	96.3%
	Castle	0	15	0	0	91.1%
	Construction	2	13	0	1	100.0%
	Farm	0	2	0	0	100.0%
	Picnic	0	14	0	0	100.0%
Sam	Play Set	Directed Vocalizations	Undirected Vocalizations	Gestures	Showing	Percent Attending
	Baby	0	13	0	0	93.5%
	Castle	0	2	1	1	94.6%
	Construction	0	7	0	0	100.0%
	Farm	0	8	0	0	100.0%
	Picnic	0	11	0	0	91.0%
Thahn	Play Set	Directed Vocalizations	Undirected Vocalizations	Gestures	Showing	Percent Attending
	Baby	1	9	0	1	100.0%
	Castle	0	9	0	0	100.0%
	Construction	0	7	0	0	100.0%
	Farm	0	14	1	0	100.0%
	Picnic	0	6	0	0	100.0%
Jessie	Play Set	Directed Vocalizations	Undirected Vocalizations	Gestures	Showing	Percent Attending
	Baby	1	12	1	0	100.0%
	Castle	2	6	3	0	82.0%
	Construction	1	9	1	0	94.6%
	Farm	0	10	0	0	93.4%
	Picnic	1	11	0	0	96.5%

Language Assessment Sessions

Each child was exposed to 4 different play sets twice during the language assessment sessions, with 4 sessions conducted in English and 4 sessions conducted in the selected world language. Dependent variables were measured using event recording and included directed vocalizations, gestures and signs, and showing. Undirected vocalizations occurred at higher rates, and did not appear social in nature, so they were graphed separately. Graphs depicting the average response rate by dependent variables can be found below in Figure 1 for each participant. Graphs depicting the response rate by dependent variables for each session can be below in Figure 2 for each participant. Graphs depicting the average undirected vocalization rate by language condition can be in Figure 3 for each participant.

For Beni, in the Spanish language conditions, he engaged in an average of 6 directed vocalizations (range 1 to 9), an average of 24.5 undirected vocalizations (range of 18 to 28), an average of 2.75 instances of gestures or signs (range 1 to 4), and an average of 1.25 instances of showing or giving (range 0 to 2). In the English language conditions, he engaged in an average of 10 directed vocalizations (range 2 to 12), an average of 21 undirected vocalizations (range of 15 to 26), an average of 1.25 instances of gestures or signs (range 0 to 3), and an average of 1.25 instances of showing or giving (range 0 to 4).

For Sam, in the Spanish language conditions, he engaged in 0 directed vocalizations, an average of 3.25 undirected vocalizations (range of 0 to 10), there were 0 instances of gestures or signs, and 0 instances of showing or giving. In the English

language conditions, he engaged in an average of .5 directed vocalizations (range 0 to 2), an average of 7.75 undirected vocalizations (range of 5 to 12), an average of 1 instances of gestures or signs (range 0 to 3), and 0 instances of showing or giving.

For Mikal, in the Russian language conditions, he engaged in an average of 0.75 directed vocalizations (range of 0 to 2), an average of 11.5 undirected vocalizations (range of 2 to 26), an average of 0.25 instances of gestures or signs (range of 0 to 1), and 1.25 instances of showing or giving (range of 0 to 3). In the English language conditions, he engaged in an average of 1 directed vocalizations (range of 0 to 2), an average of 8.5 undirected vocalizations (range of 0 to 27), an average of 0.75 instances of gestures or signs (range of 0 to 2), and 1.25 instances of showing or giving (range of 0 to 2).

For Jessie, in the Russian language conditions, she engaged in an average of 4.75 directed vocalizations (range of 0 to 10), an average of 19.75 undirected vocalizations (range of 6 to 38), an average of 3.5 instances of gestures or signs (range of 0 to 8), and .75 instances of showing or giving (range of 0 to 2). In the English language conditions, she engaged in an average of .5 directed vocalizations (range of 0 to 1), an average of 22.5 undirected vocalizations (range of 19 to 26), an average of 1 instance of gestures or signs (range of 0 to 2), and 0.25 instances of showing or giving (range of 0 to 1).

For Thahn, in the Vietnamese language conditions, he engaged in an average of 0.25 directed vocalizations (range of 0 to 1), an average of 6.75 undirected vocalizations (range of 2 to 12), an average of 0.25 instances of gestures or signs (range of 0 to 1), and 0.5 instances of showing or giving (range of 0 to 1). In the English language conditions, he engaged in an average of 1.25 directed vocalizations (range of 1 to 2), an average of

8.25 undirected vocalizations (range of 5 to 10), an average of 0.25 instances of gestures or signs (range of 0 to 1), and 0.5 instances of showing or giving (range of 0 to 1).

For Carter, in the Vietnamese language conditions, he engaged in an average of 0 directed vocalizations, an average of 0 undirected vocalizations, an average of 0.25 instances of gestures or signs (range of 0 to 1), and 0.25 instances of showing or giving (range of 0 to 1). In the English language conditions, he engaged in an average of 0 directed vocalizations, an average of 0 undirected vocalizations, an average of 0.5 instances of gestures or signs (range of 0 to 2), and 0.25 instances of showing or giving (range of 0 to 1).

Figure 1. Average response rate by language condition.

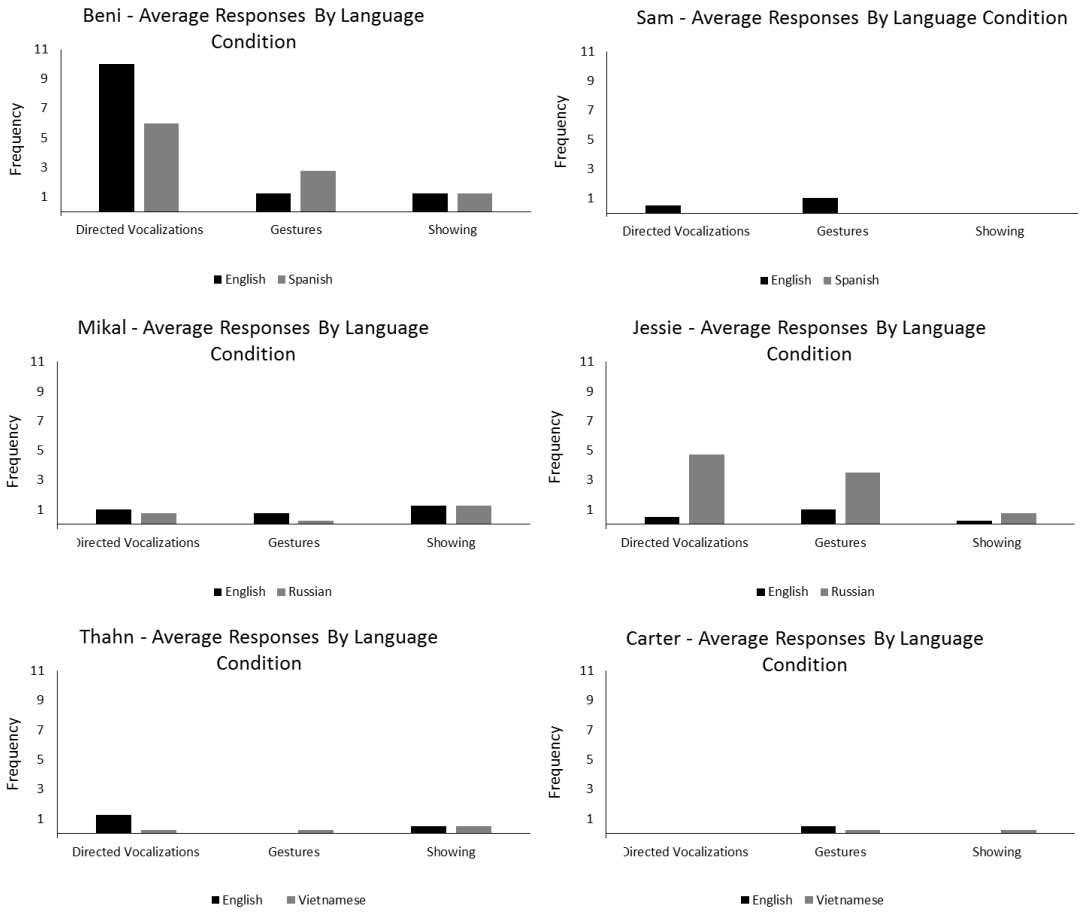


Figure 2. Response rate across sessions.

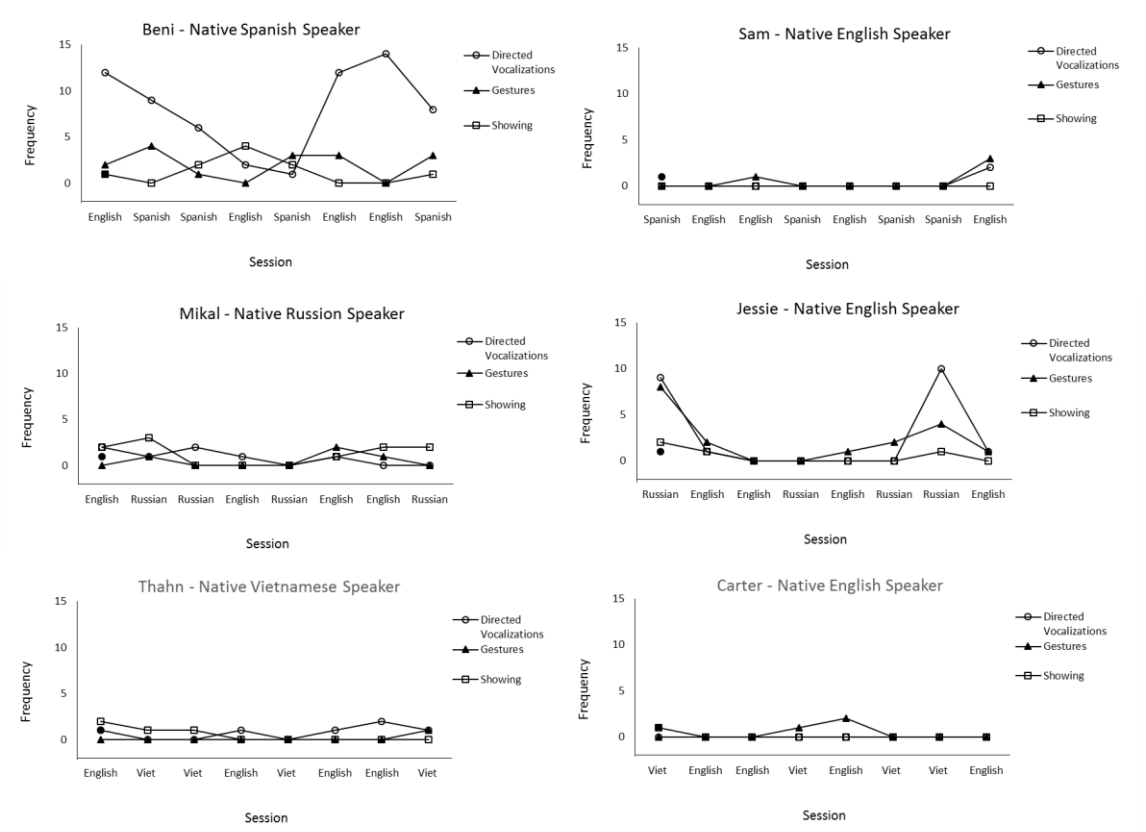
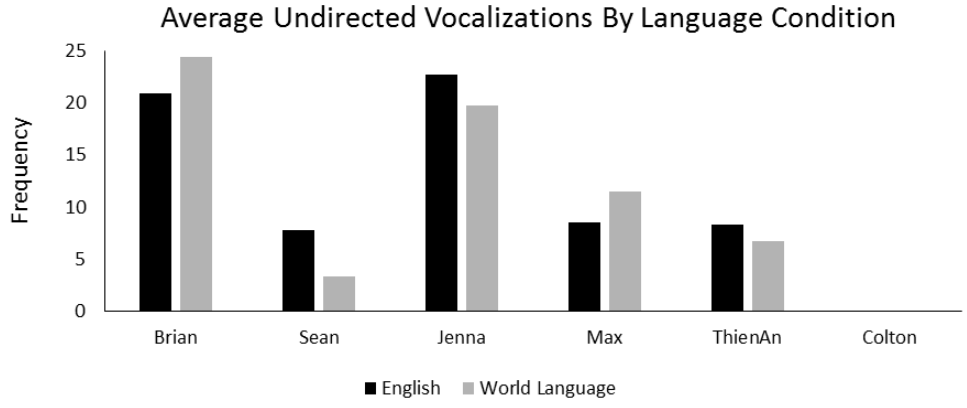


Figure 3. Average undirected vocalizations across language condition.



Attending was also measured throughout the sessions to ensure that variation in responding could not be attributed to a lack of attention or interest in objects or interventionists during sessions. For Beni, he was coded as attending on average 100% of the time in both the English and Spanish language sessions. Sam was coded as attending an average of 81% (range of 35% to 100%) of the time during English language sessions and 71% (range of 65% to 84%) of the time in Spanish language sessions. Mikal was coded as attending an average of 100% of the time in English language sessions and 99% (range of 97% to 100%) of the time in Russian language sessions. Jessie was coded as attending an average of 94% (range of 75% to 100%) of the time in English language sessions and 99% (range of 98% to 100%) of the time in Russian language sessions. Thahn was coded as attending an average of 100% of the time in both the English and Vietnamese language sessions. Carter was coded as attending an average of 76% (range of 6% to 100%) of the time in the English language conditions and 68% (range of 12% to 100%) of the time in the Vietnamese language conditions. Figure 3 depicts the average attending across language condition for each participant. Figure 4 depicts percent of time engaged in each session. Attending did not differ among participants with averages near 70% across all language sessions. Four of 6 participants remaining engaged at least 75% of the time across all sessions. For the 2 participants that were engaged less than 70% during one or more sessions, lower attending occurred in both home and world language sessions.

Figure 3. Average attending by language condition.

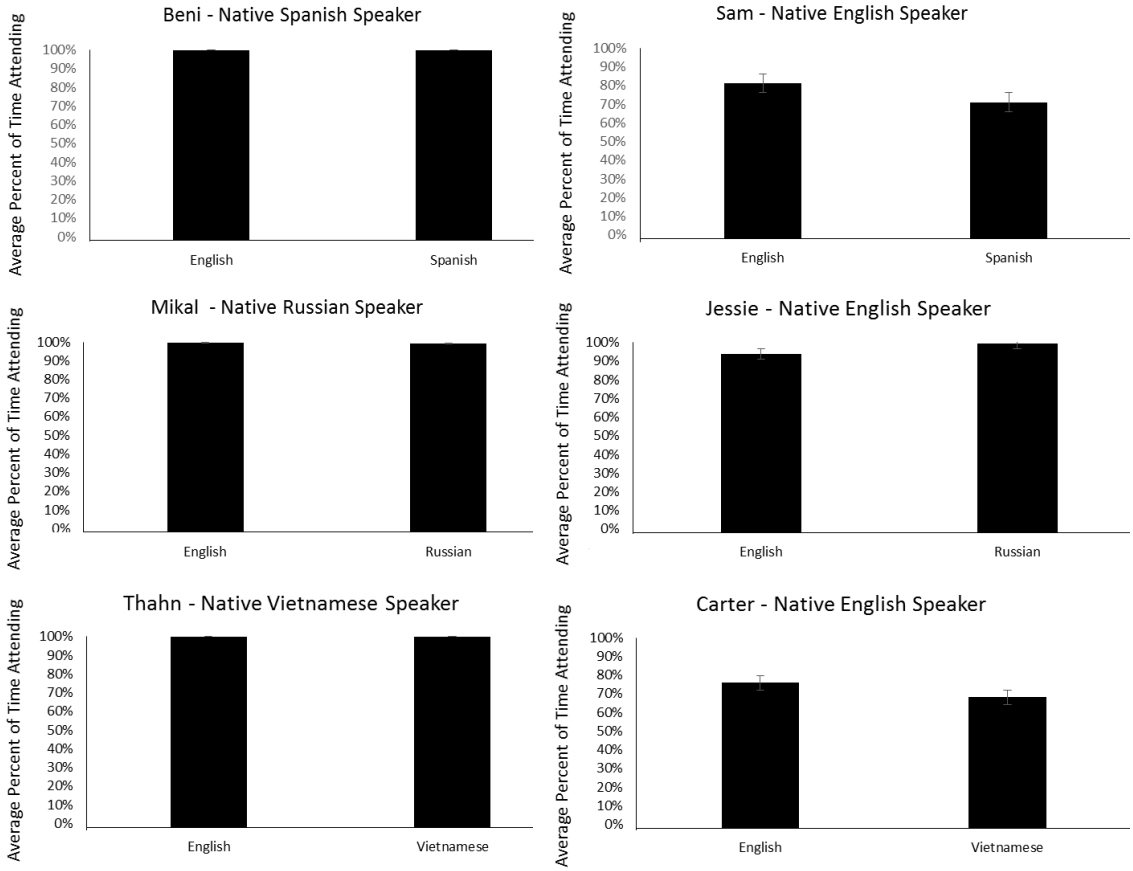
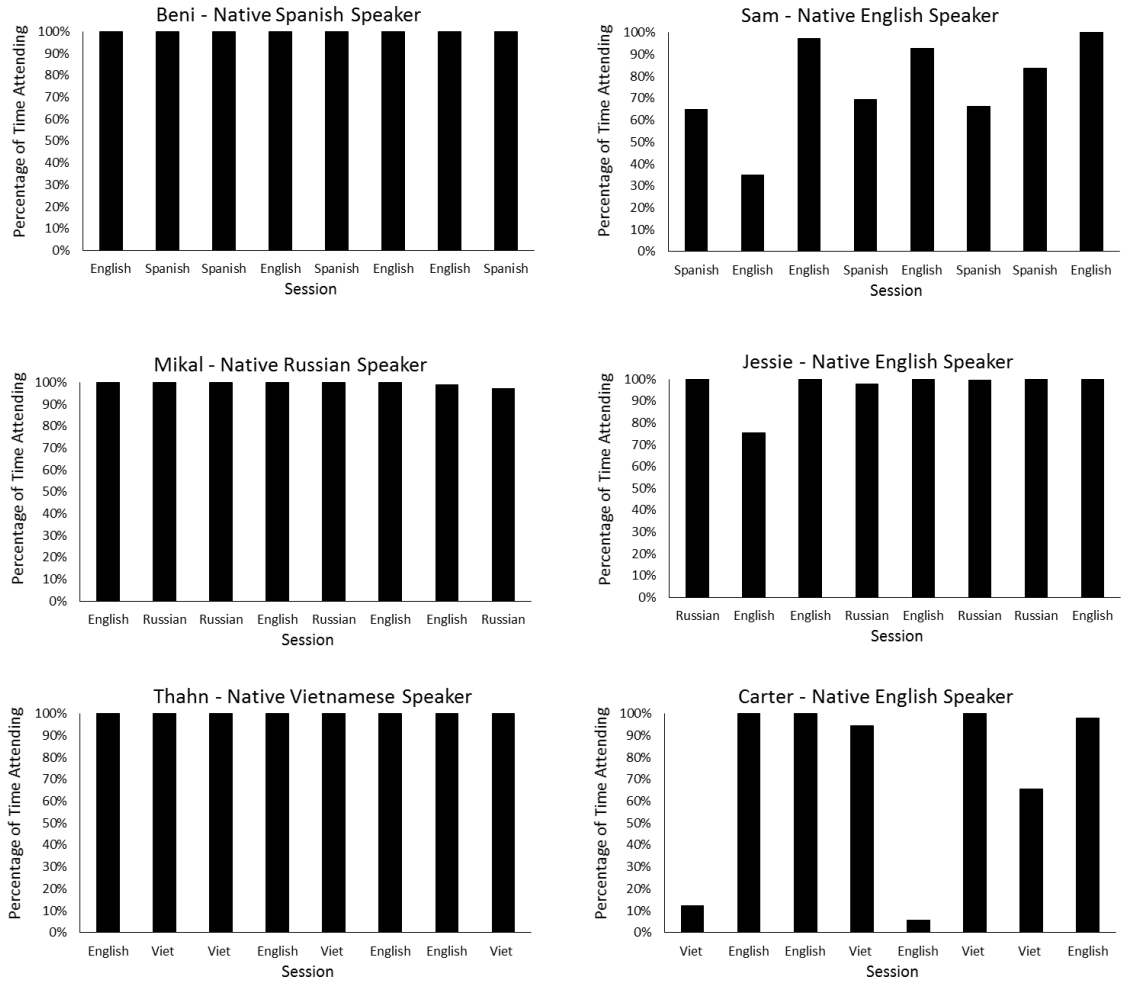


Figure 4. Attending across language assessment sessions.



Chapter 5: Discussion, Limitations, and Future Research

Discussion

The purpose of this study was to examine the rates of social communication among nonverbal children with ASD from non-English and English speaking families when exposed to different language environments. In this study, preschool age children with ASD were exposed to play sessions where an interventionist engaged with the child in English or a world language. For children from non-English speaking families, the world language selected was the language spoken in their homes, and for children from English speaking homes, a world language was selected. Overall, results of this study indicated that data were differentiated across participants, but not within participants. The results suggest that regardless of the language used in the experimental sessions, the children engaged in similar rates of directed vocalizations, undirected vocalizations, showing or giving, and signs and gestures across language assessment sessions. This was consistent for both children from English and non-English speaking homes. In addition, attending during the sessions did not differ within participants, regardless of the language used in the sessions.

Although these findings may suggest that the language spoken when working with children with ASD does not have an influence on their social communication behaviors, it does support previous research that has indicated that children from non-English speaking homes with ASD are not negatively impacted when they are exposed to more than one language. In this study, nonverbal children with ASD from non-English speaking homes did not appear to engage in more or less social communication behavior

with the interventionist when they were exposed to interactions in a language that was not the language spoken in their homes. This finding supports the notion that interventionists and families should be not be discouraged from exposing a child to a second language, and further, families should not be discouraged from continuing to use their home language with their child.

While this study suggests that children exposed to two languages do not engage in different rates of social communication, there are additional variables that may have contributed to these findings. For neurotypically developing children, they begin to discriminate between and respond to vocalizations that are in their home language between the ages of 3 to 9 months. Around the age of 3 months, infants typically start to discriminate between vocalizations that are a part of their native language and other sounds that do not compromise language (Kuhl, 2004). For the children in this study, there was very little evidence to suggest that the children with ASD were discriminating between vocalizations of others who interacted with them in their home language (versus a world language). These findings suggest that the children with ASD are not following a typical language development pattern, which is consistent with previous research that has found that children with ASD are frequently delayed in language development. Research also suggests that children with ASD are not only delayed in language development, but also appear to develop language in a different progression than neurotypically developing children. The current study suggests that there may be a delayed or different developmental pattern for children with ASD in regards to language discrimination, as the children in this study did not appear to differentiate their social communication

behaviors between languages, as would be expected of a neurotypically developing child of this age.

The initial hypothesis of the current study was that children with ASD from non-English speaking families would be more likely to engage in social communication behaviors when they were exposed to social interactions in their home language. Although the data did not support this hypothesis, the data supports previous research findings that suggest that children with ASD are not negatively impacted when exposed to intervention in more than one language. The current study indicates that children were not more or less likely to engage in different rates of social communication behaviors when exposed to more than one language, suggesting that the use of multiple languages does not necessarily deter or promote different rates of social communication behaviors. Based on these findings, it could be suggested that for young children with ASD from non-English speaking families, language does not impact the rate of social communication behaviors that the child engages in when working with interventionists who speak their home or other language. As such, these findings are aligned with previous research which encourages families to continue the use of their home language with their children, even if the child is receiving intervention in another language, as the language used in intervention did not have an impact on social communication behaviors.

Limitations

There were several limitations to this study that also warrant discussion. First, this was a single case study with 6 participants who were all located in one geographical area. Although participants spoke a variety of languages, it still remains a small group of

children with ASD, and limits the generalizability of the findings. Further, each participant from non-English speaking families came from households that spoke different languages. This also diminishes the sample size, as no two participants came from households speaking the same language. Future research in this area may want to examine children with ASD from families who speak the same language, to better control for variables related to the home language, such as the increased or decreased importance placed on verbal or nonverbal behaviors.

Second, the study utilized novel interventionists who conducted 8 sessions across 4 days (typically spread out across 2 weeks). Given that the participants were unfamiliar with the interventionist, there may have been some initial hesitation to interact with the interventionist. Although the data did not show any increasing trends in social communication behaviors across the 8 sessions, it is plausible that a child may have been more likely to interact or engage in more social communication behaviors as the child experienced more sessions with the interventionist.

Third, a variable that was not controlled for, was the amount of exposure the children with ASD from non-English speaking families had with the English language varied by participant. Some of the children with ASD from non-English speaking families had been enrolled in pre-school services for almost 2 years at the time of this study, while others had only been enrolled for approximately 1 year. Although the data did not indicate any differences within participants across language sessions, it may be a relevant variable when examining differences in rates of social communication behaviors across participants. With the length of exposure to a second language not controlled for in

this study, it is difficult to determine if this variable had any impact on rates of social communication behaviors in this study.

Fourth, the novelty of a second language for children with ASD from English speaking families was not a true comparison group in this study. Children with ASD from English speaking families were matched with children with ASD from non-English speaking families based on language scores and ADOS severity scores. Because the children with ASD from English speaking homes had not been exposed to additional world languages, these did not offer true comparisons across groups. To better control for this limitation, children with ASD from non-English speaking families who had very little exposure to a second language could be enrolled (i.e., recent immigrants to the United States or those just entering the school system).

Finally, this study measured the social communication behaviors as directed vocalizations, undirected vocalizations, showing and giving, and signs and gestures. These behaviors do not constitute the entirety of social communication, and therefore do not account for other social behaviors such as eye contact, shifts in eye gaze, or facial expressions. Future research should examine additional social communication behaviors to better understand the nature of these interactions when conducted in different languages.

Implications

Although the data gathered in this study did not indicate that there were any differences within participants in regards to social communication behaviors in sessions where they were exposed to English and world languages, the findings still have

implications as to how professionals work with individuals with ASD from non-English speaking backgrounds. Previous literature surrounding multicultural education has discussed the conventional thinking among educators and interventionists, who have largely encouraged families to speak to their child in one language, typically the language in which the child is being provided intervention. With the increased attention to multicultural education in recent years, educators and interventionists are less frequently encouraging families to speak only one language to their child, but this practice has still not been widely adapted (Kremer-Sadlik, 2005).

The present study adds to the currently small literature base related to bilingual children with ASD, further supporting the recommendations that educators and interventionists should be encouraging families to engage with their children in their home language. In this study, language did not appear to impact the social behaviors of children with ASD. Encouraging families to speak in their home language with their child with ASD could likely increase the overall opportunities for social interaction, when families are not limited to languages they may not be fluent in or are not sustained in their communities.

Future Research

The current research base on children with ASD from non-English speaking families is very limited. As such, there are several areas that should be explored to better understand the impact of language on social communication in children with ASD from non-English speaking families. First, the amount of exposure a child with ASD has to a second language warrants further study. Future research could examine if the amount of

exposure a child has to a second language impacts their social communication behaviors when exposed to intervention in a home and second language. Researchers should examine if it more important to incorporate the home language at initial stages of intervention, when a child is first exposed to a second language or if the use of a second language in intervention is not impacted by exposure time.

A second area of future research could examine social communication behaviors in a home and second language with children who do not have ASD, or who have other disabilities. Given that children with ASD are frequently delayed in verbal and nonverbal communication, it may be important to examine if social communication behaviors vary in home and world language exposure by children who are more likely to engage in social communication or those who have better developed skills in these areas.

A third area for future research should examine the social communication behavior of children with ASD from different age and skill groups. The participants in this study were all age 5 years or younger, and when combined with developmental delays, were significantly delayed when compared to same age neurotypically developing peers. Future research could examine the impact of language on social communication behaviors in older children with ASD or children who had higher verbal and nonverbal skills. Research in this area could help better understand if chronologically older children with ASD or children with ASD who had better social communication skill repertoires would be more likely to engage in these behaviors when exposed to a home and second language.

Finally, a fourth area of future research should examine the impact of language on additional social behaviors. This study focused on the impact of language on social communication behaviors. While engagement with toy sets was measured in the current study, it would be important to study additional measures related to social play to determine if those are influenced by language. Future research should examine social play behaviors, such as eye contact, joint attention, or initiating and responding to vocalizations of others as a way to capture more aspects of social interaction and play. Research in this area could help better understand which behaviors, if any, are influenced of language for bilingual children with ASD.

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